

–0.0034 from –0.721 to –0.7244 if the price of the underlying moves by 1). The current value of the option is 65.48.

b. The first step under the delta-plus method is to multiply the market value of the commodity by the absolute value of the delta.  $500 \times 0.721 = 360.5$ . The delta-weighted position is then incorporated into the measure described in section IV.D. of this appendix C E. If the bank uses the maturity approach and no other positions exist, the delta-weighted position is multiplied by 0.15 to calculate the capital requirement for delta.  $360.5 \times 0.15 = 54.075$ .

c. The capital requirement for gamma is calculated according to the Taylor expansion by multiplying the absolute value of the assumed gamma of –0.0034 by 1.125% and by the square of the market value of the underlying.  $0.0034 \times 0.0125 \times 500^2 = 10.625$ .

d. The capital requirement for vega is calculated next. The assumed current (implied) volatility is 20%. Since only an increase in volatility carries a risk of loss for a short call option, the volatility has to be increased by a relative shift of 25%. This means that the vega capital requirement has to be calculated on the basis of a change in volatility of 5 percentage points from 20% to 25% in this example. According to the Black-Scholes formula used here, the vega equals 168. Thus, a 1% or 0.01 increase in volatility increases the value of the option by 1.68. Accordingly, a change in volatility of 5 percentage points increases the value of  $5 \times 1.68 = 8.4$ . This is the capital requirement for vega risk. The total capital requirement would be  $\$73.10$  ( $54.075 + 10.625 + 8.4$ ).

By Order of the Board of Directors.

Dated at Washington, DC, this 11th day of July 1995.

**Jerry L. Langley,**  
*Executive Secretary.*

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BILLING CODES 4810–33–P; 6210–01–P; 6714–01–P

## FEDERAL RESERVE SYSTEM

### 12 CFR Chapter II

[Docket No. R–0886]

#### Capital Requirements for Market Risk

**AGENCY:** Board of Governors of the Federal Reserve System.

**ACTION:** Request for comments.

**SUMMARY:** The Board is requesting comment on a possible approach to setting capital requirements for market risk, which, if feasible, might form the basis for future enhancements to supervisory procedures. The approach would require a bank to specify the amount of capital it chose to allocate to support market risks. If cumulative losses over some subsequent trading interval exceeded the commitment, the bank would be subject to regulatory penalties, such as fines, higher capital requirements, or restrictions on trading

activities. In theory, the penalties could be calibrated to ensure that capital allocations were consistent with supervisory objectives.

**DATES:** Comments must be submitted on or before November 1, 1995.

**ADDRESSES:** Comments should refer to Docket No. R–0886, and may be mailed to William W. Wiles, Secretary, Board of Governors of the Federal Reserve System, 20th Street and Constitution Avenue, NW., Washington, D.C. 20551. Comments also may be delivered to Room B–2222 of the Eccles Building between 8:45 a.m. and 5:15 p.m. weekdays, or to the guard station in the Eccles Building courtyard on 20th Street NW. (between Constitution Avenue and C Street) at any time. Comments received will be available for inspection in Room MP–500 of the Martin Building between 9 a.m. and 5 p.m. weekdays, except as provided in 12 CFR 261.8 of the Board's rules regarding availability of information.

**FOR FURTHER INFORMATION CONTACT:** Patrick Parkinson, Associate Director (202–452–3526), or Paul Kupiec, Senior Economist (202–452–3723), or James O'Brien, Senior Economist (202–452–2384), Division of Research and Statistics; for users of the Telecommunications Device for the Deaf (TDD) only, Dorothea Thompson (202–452–3544); Board of Governors of the Federal Reserve System, Washington, D.C. 20551.

**SUPPLEMENTARY INFORMATION:** The Board is requesting comment on a proposed rulemaking that would amend its risk-based capital requirements to incorporate measures of market risk that have been developed by the Basle Committee on Banking Supervision. This proposed rule is published elsewhere in today's **Federal Register**, under Docket No. R–0884. The Board's publication of this proposed rulemaking reflects its judgment that the Basle proposal, especially the internal models option, constitutes a very significant improvement in supervisory methods for assessing capital adequacy.

Nonetheless, the Board believes that further evolution of supervisory approaches to assessing capital adequacy will be necessary over time. Techniques for measuring and managing market risk have been progressing rapidly in recent years, and further advances can be expected in the future. It is important that capital requirements provide incentives for such advances and that these requirements remain compatible with best practices as they evolve.

Recognizing the need for further evolution in supervisory approaches to

capital adequacy, the Board is requesting comment on a novel approach, which has been termed the "pre-commitment" approach. While in theory this approach might offer significant advantages over existing alternatives, many of the practical details have not yet been worked out. The Board believes that public comments would be of great assistance in evaluating the overall feasibility of the approach and in identifying the most practical and effective means of implementing it. Public comments would also be of value in assessing whether future implementation of the proposal might have unintended consequences on banks or on financial markets.

#### I. Description of the Pre-Commitment Approach

The pre-commitment approach draws its inspiration from the economic literature on "incentive-compatible" regulatory schemes.<sup>1</sup> As in the internal models approach to market risk capital requirements that the Board has proposed, the regulatory objective is to require a bank to maintain sufficient capital to cover potential losses in its trading activities from all but the most extreme price movements.<sup>2</sup> The internal models approach seeks to ensure compliance with this objective by standardizing the parameters under which a bank would calculate the value at risk (VaR) of its trading portfolio and then applying a multiplication factor to each bank's calculated VaR, in part to cover potential losses over longer horizons. By contrast, the pre-commitment approach would seek to induce banks to meet the regulatory objective by providing them with a common set of economic incentives.

Specifically, in the pre-commitment approach a bank would specify its desired amount of capital for supporting market risks and would commit to manage its trading portfolio so as to limit any cumulative trading losses over some subsequent interval to an amount less than that capital allocation. The length of the interval would be established by the bank's regulator, based on the regulator's ability to

<sup>1</sup> The theory underlying the pre-commitment approach is presented in Paul H. Kupiec and James M. O'Brien, "A Pre-Commitment Approach to Capital Requirements for Market Risk," Board of Governors of the Federal Reserve System, Division of Research and Statistics, staff memorandum, June 1995. This paper can be obtained from the Board's Freedom of Information Office.

<sup>2</sup> The scope of activities and banks that would be covered under a pre-commitment approach presumably would be the same as the scope of the proposed rulemaking on market risk that was referenced above.

monitor losses from the bank's trading activities and, if necessary, to force reductions in the size of the bank's open positions. The interval might be three or six months, but a shorter interval would be possible if the regulator can effectively monitor trading activity at that frequency and if the relevant markets are sufficiently liquid that the trading positions could, if necessary, be closed out promptly without substantial market impact. At the end of the interval, the bank could either increase or decrease its capital commitment.

To ensure that the bank committed an amount of capital commensurate with the risks in its trading portfolio and its capacity to manage those risks, the regulator would need to provide appropriate incentives in the form of economic costs or "penalties" for failing to limit losses to less than the capital commitment. The magnitude of the penalties would depend on the regulatory objective. A bank that is managed as a going concern would be expected to choose a capital commitment that entailed a marginal cost of regulatory capital equal to the expected cost of the penalty for a violation. The more conservative the capitalization that the regulator desired, the larger would be the specified penalty.

Given these costs, the bank's choice of a capital commitment would be based on a self-assessment of its capabilities to measure and control the risks of its trading activities. The adequacy and reliability of its internal models for measuring risk would play an important role in the bank's determination. But, as recognized in the qualitative standards for risk management that are part of the internal models approach, there is more to risk management than risk measurement. In addition to internal models for risk measurement, sound risk management requires a detailed structure of limits on risk and a strong management information system for controlling, monitoring, and reporting risks.

The measurement of market risk is fraught with uncertainty.

The magnitude of the low probability events about which regulators are concerned (for example, the lower limit of a 99 percent confidence interval for trading gains and losses) simply cannot be estimated with much precision.<sup>3</sup> A corollary of this result is that "back-

tests" of a null hypothesis that a bank's internal model is accurately estimating a 99 percent confidence limit have little statistical power against alternatives that would involve substantial underestimation of potential losses.

A further implication is that declines in the market values of portfolios beyond those anticipated by the models are inevitable. In such circumstances, what is critical—and what cannot be captured in standard risk measures—is the potential for losses to be contained through active portfolio management, and, conversely, the potential for catastrophic losses if such active management is not forthcoming. In choosing its capital commitment, a bank's management would incorporate its judgments about the combined effectiveness of all critical elements of the bank's risk management system—not only its internal models, but also its structure of risk limits and the management information systems and audit programs it has in place to ensure compliance with those limits. Furthermore, management would have a strong incentive to strengthen over time all elements of its risk management system to economize on capital while avoiding the penalties.

The bank's choice of a capital commitment for market risk could be subject to review by supervisory authorities. Bank management could be expected to explain how cumulative losses would be contained within the amount of the commitment. This necessarily would require documentation of how internal models are used to measure risks, how limits are applied to the measured risks, how compliance with limits is ensured, and how management would respond to unanticipated losses. Furthermore, supervisors could condition use of the pre-commitment alternative on the bank's meeting the same qualitative standards for market risk management systems that would be required for use of the internal models approach, or perhaps on even more stringent standards.

It would be important to emphasize, however, that any supervisory review of the commitment would in no way diminish the bank management's responsibility for setting aside adequate capital to cover its market risks. An attractive feature of the pre-commitment approach is that it would underscore the responsibility of bank management for maintaining adequate capital, even if the amount needed exceeds what otherwise might be regulatory minimum requirements.

The key to the feasibility and effectiveness of the pre-commitment

approach is the specification of the penalties that would result from a failure to limit trading losses to an amount less than the commitment. Analysis suggests that the cost of the penalties should increase with the size of the gap between the losses incurred and the pre-commitment. These penalties could take various forms. Fines (monetary penalties) would be especially effective in creating appropriate incentives because of their transparency. (U.S. insured banks might be required to pay any fines into the Bank Insurance Fund.) As an alternative to fines, supervisors could impose punitive capital charges. The severity of fines or capital penalties could be reduced if they were accompanied by supervisory sanctions, such as restrictions on future trading activity. The costs of these restrictions would be measured by the loss of profitable trading activities in future periods. Such costs could be considerable; a bank that is unable to pursue profitable trading opportunities for an extended period would have difficulty covering overhead costs in its trading businesses and, over time, likely would suffer defections by its best traders to other firms.

For the pre-commitment approach to be credible, banks would need to be reasonably certain that supervisory authorities would impose the specified penalties when losses exceed the commitment. The certainty of the penalty would strengthen the incentive for the bank to make the initial capital commitment commensurate with the supervisor's desired coverage of potential losses. Nonetheless, supervisors would need to reserve the right to suspend the penalties in the event of extreme price movements that reflect macroeconomic instability. This would help ensure that banks could continue to provide liquidity to markets following such stressful episodes. But suspensions should not include situations in which a penalty would simply be very costly to an individual bank but without systemic consequences.

Market forces might also be utilized to provide banks with incentives to allocate adequate capital. If the capital commitment were publicly disclosed, the reporting of losses in excess of the commitment not only would imply that supervisory sanctions had been imposed on the bank, but could also cast doubts on the effectiveness of the bank's risk management capabilities. Together, these factors could adversely affect its share price and its funding costs. For this reason, some banks might actually be tempted to commit more capital than is necessary to meet regulatory

<sup>3</sup> This point is developed further in Paul H. Kupiec, "Techniques for Verifying the Accuracy of Risk Measurement Models." Board of Governors of the Federal Reserve System, Division of Research and Statistics, staff memorandum, April 1995. This paper can be obtained from the Board's Freedom of Information Office.

objectives. However, this tendency toward conservatism would be tempered by fears that an excessive capital commitment would cause the public (including stock analysts and rating agencies) to overestimate the riskiness of the bank's trading activities. Thus, market forces could be harnessed to induce banks to make appropriate capital commitments.

## II. Issues and Questions for Public Comment

The basic issue is whether the pre-commitment approach is feasible and, if so, whether it might form the basis for future enhancements to supervisory approaches to assessing capital adequacy.

Q1. Should the Board explore use of the pre-commitment approach during the time that will elapse before the scheduled implementation of the proposed market risk capital requirements?

Q2. What are the advantages of the pre-commitment approach compared to other approaches under consideration by supervisors? Would it, in fact, produce capital allocations that more accurately reflect banks' assessments of trading risks? Would it be more compatible with banks' risk measurement systems? Would it provide stronger incentives for the improvement of risk management systems?

Q3. What are the potential drawbacks to the pre-commitment approach? Could penalties be destabilizing to banks? To the financial system? What other unintended consequences might result from implementation of the approach?

Before the pre-commitment approach could be implemented, the penalties associated with failure to limit trading losses to an amount less than the capital commitment would need to be specified more precisely.

Q4. What form should the penalties take? Fines? Higher future capital requirements? Other restrictions on future trading opportunities?

Q5. Should regulators reserve the right to waive the penalties under

certain circumstances? If so, under what circumstances? To avoid adverse effects on market liquidity? To avoid impairing a bank's capital so significantly that its viability is threatened? Is there a danger that the prospect of a waiver could undermine the incentive effects of the penalties? How could such adverse incentive effects of waivers be minimized?

Q6. Should capital commitments, trading results, and penalties be publicly disclosed? What effects would public disclosure have on capital allocations? On trading behavior? How would stockholders and creditors react to news that a capital commitment had been violated? Could the reactions be destabilizing? On the other hand, if commitments and results are not publicly disclosed, would the approach lack credibility?

Another set of issues that would need to be addressed is the restrictions and limitations that would be placed on use of a pre-commitment approach.

Q7. Are qualitative standards for market risk management necessary to implement the pre-commitment approach? What qualitative standards for market risk management should be met by banks seeking to use the pre-commitment approach? Are the qualitative standards set out by the Basle Supervisors for use of the internal models approach sufficient? Or should more stringent standards be imposed? If so, in what ways should the standards be more stringent?

Q8. Should a bank's choice of a capital commitment be subject to review by supervisory authorities? Or would such a review be unnecessary or undesirable?

Q9. The incentive effects of the pre-commitment approach can be relied upon to induce banks to make realistic capital commitments only if the bank is being managed as a going concern. (A bank would not necessarily be concerned about penalties that would be imposed only in the event of its insolvency.) Could this potential problem be addressed adequately by

limiting use of the pre-commitment approach to adequately capitalized banks (or even to well-capitalized banks)?

Q10. Even for well-capitalized banks, is the approach viable if market risk is the predominant element in the institution's overall risk profile? Or must its use be restricted to banks for which market risk associated with the trading account is a relatively small element in their overall risk profile? As practical matter, do banks typically allocate more than a small fraction of their total capital to cover market risk?

A final issue that would benefit from public comment relates to how trading gains and losses should be measured for purposes of determining whether the capital commitment has been violated.

Q11. Should spreads on customer or market-making businesses be included in trading gains and losses or should they be excluded? Why or why not? Can revenues from customer accommodation and market making be separated reliably from revenues from position taking?

Q12. Should gains or losses from changes in the credit quality of assets held in trading accounts be included or excluded? If included, would there be any need for separate capital requirements for specific risk (as opposed to general market risk)?

Q13. In general, are profits and losses on trading accounts sufficiently transparent that supervisors could reliably determine whether a capital commitment has been violated? Could concerns on this score be addressed through qualitative standards for valuation (e.g., standards for documentation of policies regarding valuation adjustments and adherence to those policies)?

By order of the Board of Governors of the Federal Reserve System, July 12, 1995.

**William W. Wiles,**

*Secretary of the Board.*

[FR Doc. 95-17541 Filed 7-24-95; 8:45 am]

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